

## GAHP Recommended Cardiac Necropsy Prosection Guide

The goal of this guide is to assist the prosector in following the recommended protocol for evaluation of ape hearts at necropsy. Before beginning the necropsy, the prosector should choose which protocol for histologic evaluation they wish to pursue as this will impact how the heart is sectioned and fixed at the time of necropsy (see Decision Point below). The “Basic Cardiac Protocol” protocol provides an evaluation of the myocardium, valves and a limited evaluation of coronary vessels. In contrast, the “Detailed Cardiac Protocol” protocol provides the same evaluation as the Basic but evaluates the conduction system, a more extensive evaluation of the myocardium and coronary vessels and can evaluate foramen ovale patency. In cases with known conduction system abnormalities, it is highly recommended that the “detailed” protocol be followed as this will provide the most information possible.

Either the whole heart or sections of the heart can be submitted for evaluation. Submission of heart sections are adequate for the basic protocol. If the whole heart is submitted, then either the “Basic” or “Detailed” protocol can be followed. Sectioning of the conduction system is not covered in this guide. Therefore, if the prosector is uncomfortable obtaining sections of the conduction system and the “Detailed” protocol is requested, it is recommended that either the heart be submitted whole or the 3 (or 4) cm slab and the entire top of the heart be submitted to the pathologist for evaluation.

In this guide, where it mentions to take a photograph with a ruler, it is critical that the ruler is visible so that measurements can be made off of the digital images.

*\*Please note – in this guide images are provided for general guidance and do NOT represent a “Normal” ape heart.*

### **What You Need:**

- Digital Camera
  - Blue or black solid background
  - Small ruler or size marker for photograph
- String or twine
- Scale for weighing the heart
- Larger (1 foot/30 cm) ruler for measuring
- Necropsy knife or scalpel and scissors
- Either surgical staple, or surgical needle/thread, to mark the myocardial slices

### **Questions? Feel free to contact:**

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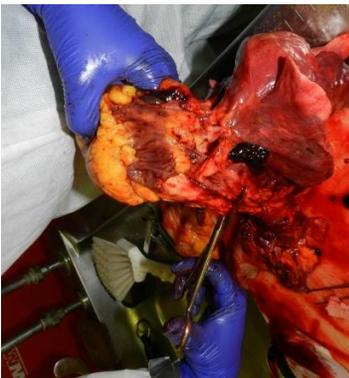
## Ape Cardiac Necropsy Protocol

### 1. Open the chest and take a photograph of the heart *in situ*



### 2. Separate the heart and weigh

*Cut the great vessels close to the lungs, flush out clots and weigh the whole heart. Great vessels should be cut approximately 5 cm from the base of the heart.*



### 3. Photograph whole heart with a small ruler / size marker taking 4 images

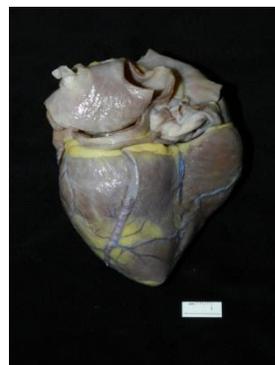
*Start with the anterior side facing up (right auricle is on the left; left auricle is on the right in the photograph). For each photograph, rotate the heart 90° from the previous image*



Anterior



Right



Posterior



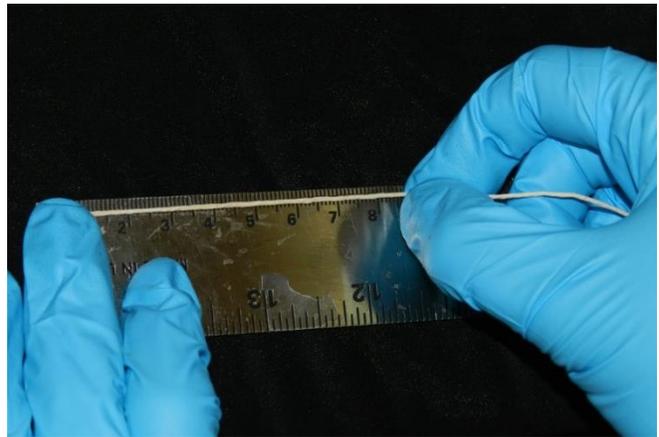
Left

#### 4. Photograph heart base



#### 5. Measure circumference

*Take string or twine and wrap it around the heart at the level of the coronary groove then lay the length of the string that outlines the circumference along the larger ruler to measure.*

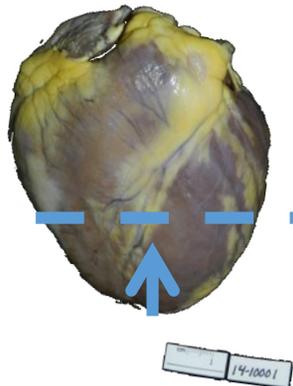


## DECISION POINT

WHOLE HEART VS SELECTED SECTION SUBMISSION - SEE ABOVE

### If submitting whole heart:

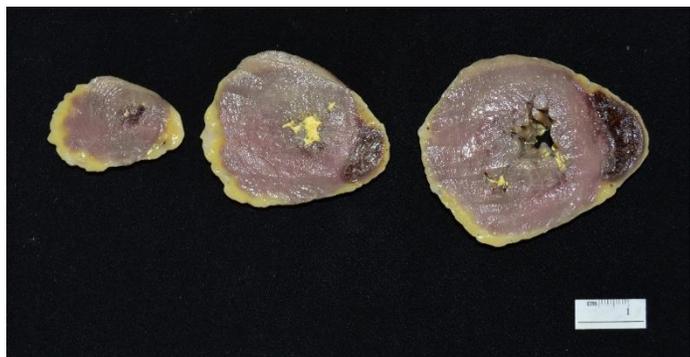
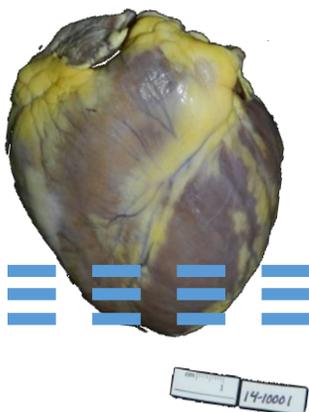
6. Single transverse cut 3cm from apex (bonobos, chimpanzees, and orangutans) or 4cm from the apex (gorillas), flush out clots and cradle or suspend heart in large volume of formalin. After complete fixation (>48hr), ship in smaller volume of formalin.



### If submitting heart sections:

6. Make 1 cm slices up to 3 (or 4) cm from the apex. Photograph with ruler & fix final slice (3 or 4 cm) in formalin.

*Make parallel slices perpendicular to the long axis. Final slice should be 3 cm from the apex in bonobos, chimpanzees and orangutans but 4 cm from the apex in gorillas (thus for a gorilla you would have 4 slices in the image). Mark the posterior side with a removable staple or thread to assist the pathologist in sectioning.*



**7. Open right side of heart along lines of flow. Measure R AV valve and pulmonic valve circumference. Photograph both valves. Section R atrium and ventricle and fix in formalin.**

*Open the atrium from posterior vena cava to the auricle. Cut from the back (posterior side) of the right atrium into the right ventricle and out the pulmonary artery. Use string to measure the right atrioventricular (tricuspid) valve circumference and photograph. Take a long axis section of the right atrium and ventricle with valve and fix in formalin. Using string, measure the circumference of the pulmonic valve and photograph.*



**8. Open the left side of the heart. Measure the L AV valve circumference and photograph. Measure aortic valve circumference and photograph. Section L atrium, AV valve and ventricular free wall as well as the interventricular septum with the aorta and fix in formalin.**

*Open the left atrium from pulmonary vein to auricle and then make a single longitudinal cut perpendicular to this through the middle of the left ventricular free wall. Measure the left atrioventricular valve circumference using the string method. Photograph the inside of the left side of the heart with a ruler alongside the heart. Take a longitudinal section through the left atrium, atrioventricular valve and ventricle and fix in formalin. Cut through the left AV valve along the septum and into the aorta to open the aorta. Measure the aortic valve circumference using the string method. Take a longitudinal section of the septum from the aorta into the left ventricle and fix in formalin.*



**9. Take a cross section of the aorta at the arch and fix in formalin.**

**10. Submit all photographs and measurements along with tissues to the pathologist to be incorporated into the final electronic necropsy report.**

GAHP Cardiac Necropsy Check Sheet (fillable PDF) –  
*please submit with tissues and images to pathologist*

**Whole Heart Submission**

Photographs:

- In situ*       Heart base       4 Views: Anterior, Right, Posterior, Left

Measurements:

Heart weight \_\_\_\_\_ (g)

Heart circumference \_\_\_\_\_ (cm)

Fixed in Formalin to Submit:

- Entire heart

**Selected Section Submission**

Photographs:

- In situ*       4 Views: Anterior, Right, Posterior, Left  
 Heart base       3 (or 4 for gorillas) slab sections from apex  
 R AV valve       Pulmonic valve  
 L AV valve       Aortic valve

Measurements:

Heart weight \_\_\_\_\_ (g)

Heart circumference \_\_\_\_\_ (cm)

R AV valve \_\_\_\_\_ (cm)

Pulmonic valve \_\_\_\_\_ (cm)

L AV valve \_\_\_\_\_ (cm)

Aortic valve \_\_\_\_\_ (cm)

Fixed in Formalin to Submit:

- 3 or 4 cm slab cross-section  
 R Atrium-Ventricle with R AV valve  
 Interventricular septum w/ aortic valve  
 L Atrium-Ventricle with L AV valve  
 Aorta  
 Conduction System (if submitting for detailed protocol)